Volunteer Lake Assessment Program Individual Lake Reports
WAUKEWAN, LAKE, NEW HAMPTON, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	7,551	Max. Depth (m):	21.4	Flushing Rate (yr¹)	0.6		
Surface Area (Ac.):	913	Mean Depth (m):	6.7	P Retention Coef:	0.7		
Shore Length (m):	13,000	Volume (m³):	24,809,000	Elevation (ft):	539		

TROPHIC CLASSIFICATION

Year	Trophic class
1982	OLIGOTROPHIC
1994	OLIGOTROPHIC

KNOWN EXOTIC SPECIES

Variable Milfoil

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator and the chlorophyll a indicator is okay.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Oxygen, Dissolved	Bad	There are >10% of samples (minimum of 2), exceeding criteria with one or more samples considered large exceedance.
	Dissolved oxygen satura	Slightly Bad	There are >10% of samples (minimum of 2), exceeding criteria.
	Chlorophyll-a	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator.
Primary Contact Recreation	Escherichia coli	Encouraging	There are no geometric means or there are > 2 single samples but those samples are within 75% of the geometric means criteria. More data needed.
	Cyanobacteria hepatoto	Slightly Bad	Cyanobacteria bloom(s).
	Chlorophyll-a	Very Good	There are a total of at least 10 samples with 0 exceedances of indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

LAKE WAUKEWAN - TOWN BEACH	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.

Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	14.6	Barren Land	0.02	Grassland/Herbaceous	0.79
Developed-Open Space	3	Deciduous Forest	25.15	Pasture Hay	1.08
Developed-Low Intensity	1.29	Evergreen Forest	9.6	Cultivated Crops	0.74
Developed-Medium Intensity	0.56	Mixed Forest	39.35	Woody Wetlands	1.81
Developed-High Intensity	0.14	Shrub-Scrub	1.83	Emergent Wetlands	0.05

VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS

WAUKEWAN, WINONA STN., MEREDITH

2014 DATA SUMMARY

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

OBSERVATIONS AND RECOMMENDATIONS (*Refer to Table 1 and Historical Deep Spot Data Graphics*)

◆ **CHLOROPHYLL-A:** Chlorophyll levels remained stable and low from July to August. Average chlorophyll levels were much less than the state median and historical trend analysis indicates relatively stable chlorophyll levels since monitoring began.

◆ **CONDUCTIVITY/CHLORIDE:** Deep spot and Outlet conductivity and chloride levels remained slightly elevated and greater than the state median. Historical trend analysis indicates significantly increasing (worsening) epilimnetic (upper water layer) conductivity since monitoring began. Chloride levels in Brookside Lane Stream were the highest measured for all stations in May following spring snow melt.

◆ **TOTAL PHOSPHORUS:** Epilimnetic phosphorus was very low in July and then increased slightly in August. Metalimnetic (middle water layer) phosphorus decreased gradually from July to August and remained low. Hypolimnetic (lower water layer) phosphorus Increased slightly from early July to late July and then decreased in August. Average epilimnetic phosphorus increased slightly from 2013 but remained much less than the state median. Historical trend analysis indicates significantly decreasing (improving) epilimnetic phosphorus since monitoring began. We hope to see this continue! Brookside Lane Stream and Outlet phosphorus levels were also very low.

◆ **TRANSPARENCY:** Transparency measured without the viewscope (NVS) was low in early July to due wave action affecting Secchi disk viewing. Transparency improved in late July and then decreased in August. Average transparency remained much better than the state median and historical trend analysis indicates stable transparency since monitoring began. Transparency measured with the viewscope (VS) improved from July to August and was better than transparency measured without and likely a more accurate measurement of water clarity.

◆ **TURBIDITY:** Epilimnetic and metalimnetic turbidities were slightly higher in early July following a significant rain event, however turbidity decreased and remained low through August. Hypolimnetic turbidity increased gradually from early July to August and likely a result of the accumulation of organic compounds in hypolimnetic waters when dissolved oxygen levels decreased to below 1.0 mg/L. Outlet turbidity was low on each sampling event.

◆ **PH:** Deep spot pH levels were within desirable range 6.5—8.0 units however have historically fluctuated below the desirable range. Historical trend analysis indicates relatively stable epilimnetic pH since monitoring began.

◆ **RECOMMENDED ACTIONS:** Water quality has remained stable throughout the years, and epilimnetic phosphorus levels have improved. This is a great sign. However, winter deicing activities in the watershed have likely contributed to the worsening conductivity in the lake. If not done already, encourage local road agents and winter maintenance companies to obtain a Voluntary NH Salt Applicator license through UNH's Technology Transfer Center's Green SnowPro Certification program. Visit www.t2.unh.edu/green-snowpro-training-and-certification for more information and education resources. Encourage local lake and watershed residents to utilize best management practices for applying de-icing materials on their driveways and walkways. Expand monitoring program to collect water quality data from major tributaries on a monthly basis to better assess pollutant loads to the lake. Keep up the great work!

Station Name	Table 1. 2014 Average Water Quality Data for LAKE WAUKEWAN, WINONA STN.								
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	Total P ug/l	Trans. m		Turb. ntu	pH
						NVS	VS		
Epilimnion	6.1	1.63	21	106.8	4	6.88	7.92	0.69	6.99
Metalimnion				106.9	5			0.57	6.95
Hypolimnion				107.8	6			2.19	6.64
Brookside Lane Stream			41		3			0.17	6.51
Outlet			21	108.9	5			0.73	6.98

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.

Chloride: > 230 mg/L (chronic)

E. coli: > 88 cts/100 mL – public beach

E. coli: > 406 cts/100 mL – surface waters

Turbidity: > 10 NTU above natural level

pH: between 6.5-8.0 (unless naturally occurring)

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.

Alkalinity: 4.9 mg/L

Chlorophyll-a: 4.58 mg/m^3

Conductivity: 40.0 uS/cm

Chloride: 4 mg/L

Total Phosphorus: 12 ug/L

Transparency: 3.2 m

pH: 6.6

HISTORICAL WATER QUALITY TREND ANALYSIS

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Worsening	Data significantly increasing.	Chlorophyll-a	Stable	Trend not significant; data moderately variable.
pH (epilimnion)	Stable	Trend not significant; data moderately variable.	Transparency	Stable	Trend not significant; data show low variability.
			Phosphorus (epilimnion)	Improving	Data significantly decreasing.

Historical Trend Epilimnetic Conductivity and pH

Historical Deep Spot Chlorophyll-a, Epilimnetic Total Phosphorus & Transparency Data

This report was generated by the NH DES Volunteer Lake Assessment Program (VLAP). For more information contact VLAP at (603) 271-2658 or sara.steiner@des.nh.gov